Comparative Study on the Incidence of Pancreatic Fistula and Biliary Fistula in Patients after Pancreaticoduodenectomy with Two Gastric Tube Placement Sites

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Abstract

Objective: To investigate the effect of gastric tube placement on pancreatic fistula and biliary fistula after pancreaticoduodenectomy. Methods: The clinical data of 77 patients undergoing pancreaticoduodenectomy admitted from November 2014 to December 2020 were retrospectively analyzed. According to the location of gastric tube, they were divided into group A (31 cases) and group B (46 cases). In group A, the gastric tube was inserted into the jejunum input loop through the gastrointestinal anastomosis until near the bilioenteric anastomosis; In group B, the gastric tube was inserted into the jejunum input loop about 5cm through the gastrointestinal anastomosis. The incidence of postoperative pancreatic fistula and biliary fistula complications was compared between the two groups. Results: There were no significant differences in operative time, intraoperative blood loss and gastric tube indwelling time between the two groups (P>0.05). The incidence of pancreatic fistula and biliary fistula in group A was lower than that in group B, and the difference was statistically significant (P<0.05). Conclusion: The placement of gastric tube into jejunal input loop through gastrointestinal anastomosis to the vicinity of biliary anastomosis can significantly reduce the incidence of pancreatic fistula and biliary fistula after pancreaticoduodenectomy, which has certain clinical reference value.

Keywords

Pancreaticoduodenectomy, Stomach Tube, Gastrointestinal Decompression, Pancreatic Fistula, Biliary fistula

Pancreaticoduodenectomy (PD) is the preferred surgical method for the treatment of many hepatobiliary and pancreatic diseases, including pancreatic head cancer, lower bile duct cancer, duodenal papillary carcinoma, ampullary carcinoma and so on. Due to its wide surgical scope, multiple organs involved, large trauma, and long operation time, there are many postoperative complications [1-2]. Therefore, how to make patients in a short period of smooth recovery is the focus of clinical attention. Preoperative gastric tube placement not only provides an effective pathway for nasogastric feeding, gastric washing, gastrointestinal decompression and other operations, but also reduces the incidence of complications after pancreaticoduodenectomy to a certain extent, providing conditions for patients to obtain ideal prognosis [3-5]. Therefore, in order to further explore a better solution, this study analyzed the influence of two gastric tube placement sites on postoperative pancreatic fistula and biliary fistula complications.
by comparing them, aiming to provide a reference for clinical practice.

1. Data and Methods

1.1 The General Information

The clinical data of 77 patients undergoing pancreaticoduodenectomy admitted from November 2014 to December 2020 were retrospectively analyzed, and they were divided into group A (31 cases) and group B (46 cases) according to the location of gastric tube. Inclusion criteria: (1) All patients were definitely diagnosed as periampullary tumor, which met the indications of pancreaticoduodenectomy; (2) No obvious dysfunction of heart, lung, kidney and other important organs; (3) Patients aged ≥18 years; (4) the preoperative serum bilirubin level was lower than 150μmol/L; (5) Serum albumin level was higher than 30g/L before operation; (6) Informed consent of patients. Exclusion criteria: (1) Presence of vascular aggressors; (2) With distant metastasis; (3) Patients who received neoadjuvant chemoradiotherapy before surgery; (4) Patients who underwent intraoperative pancreatectomy; (5) People with mental illness. In group A, there were 15 males and 16 females; The average age was (56.19±1.30) years. 11 cases were complicated with underlying diseases. In group B, there were 26 males and 20 females; The average age was (55.85±1.38) years. 23 patients were complicated with underlying diseases. There was no significant difference in general data between the two groups (P > 0.05), as shown in Table 1. This study was approved by the ethics Committee of our hospital, and patients and their families were informed and signed the consent form.

<table>
<thead>
<tr>
<th>Table 1. Comparison of general data between the two groups</th>
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<td><strong>project</strong></td>
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<td><strong>gender</strong></td>
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<tr>
<td><strong>Age</strong></td>
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<td><strong>Past medical history</strong></td>
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<td><strong>Pathological classification</strong></td>
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</table>

Note: A represents the value of ², and the row × column Chi-square test is adopted. B represents t value, and t-test of two independent samples is adopted.

1.2 Criteria for pancreatic fistula

According to the International Study Group of Pancreatic Fistula (ISGPF) 2016 Diagnostic criteria [6]: (1) Amylase concentration in postoperative abdominal drainage fluid was 3 times higher than serum amylase concentration and lasted for more than 3 days, and was correlated with clinical prognosis; (2) One or more of the following: pro-
gressive abdominal pain, abdominal distension and other peritoneal irritation symptoms, body temperature >38.5℃, White blood cells >15 x 10⁹ / L, B - ultrasound or CT auxiliary examination confirmed pancreatic fistula.

1.3 Biliary fistula criteria

According to the definition of biliary fistula by international Liver Surgery Research Group, the occurrence time of biliary fistula is ≥3 days after surgery, and the concentration of bilirubin in drainage is at least 3 times of the normal concentration of bilirubin in plasma, or interventional or surgical treatment is required due to bile aggregation or biliary peritonitis [7].

1.4 Surgical methods

1.4.1 Surgical preparation method

Standard pancreaticoduodenectomy was performed in both groups, and the digestive tract was reconstructed by Child method. According to the diameter of bile duct greater than or less than 1cm, continuous suture of anterior and posterior wall or continuous suture of posterior wall and intermittent suture of anterior wall were used for bilioenterostomy; Anastomosis between the broken end of pancreas and the side wall of jejunum was performed using “4-0” Prolene line for continuous suture between the dorsal wall of the broken end of pancreas and the saccoplastic layer of jejunum. In both groups, a 14F disposable silicone gastric tube and a disposable negative pressure drainage device were used before surgery. (Silicone stomach tube with a small hole at the top side has two holes, the side hole and the distance between the top hole of about 8 to 10 cm, stomach tube diameter of about 5 mm), conventional take herself once hair to xiphoid process for the length of the tube placement via nasal cavity insert gastric tube into the stomach, generally about 45-55 cm, for patients with gastric tube intubation strictly follow the operation standards and processes, Ensure the safety and reliability of intubation. The specific operation details vary mainly for the anterior placement of gastric tube. Group A: During the operation, the gastric tube was placed into the jejunum of the input loop from the gastrointestinal anastomosis about 20-25cm, the front end was located in the intestinal lumen near the biliary anastomosis, and was fixed on the posterior wall of the gastrointestinal anastomosis with the “6-0” Prolene line, and the gastric tube was externally fixed at the nasal outlet and the cheek. Group B: During the operation, the gastric tube was inserted into the jejunum input loop about 5cm through the gastrointestinal anastomosis, and the fixation method was the same as that of Group A.

1.4.2 Postoperative management

Prophylactic antibiotics were used in both groups to prevent the infection of surgical site. Anti-inflammatory, fasting, acid production, somatostatin and other treatments were continued after surgery, and abdominal ultrasound was performed when necessary. The color, properties, amount and amylase of drainage fluid in gastrointestinal decompression tube and peripancreatic drainage tube were observed daily in both groups, and the occurrence of pancreatic fistula and biliary fistula was observed. If there were no complications such as pancreatic fistula and biliary fistula, 5 to 7 days after the recovery of intestinal sounds and anal exhaust, the gastric tube was clamped to test drinking water. If there was no abdominal distention and abdominal pain, the gastric tube could be removed. The occurrence of complications as the case is handled.

1.5 Observation Indicators

(1) Comparison of operative duration and intraoperative blood loss between the two groups;
(2) Postoperative recovery: length of hospital stay, time of gastric tube removal and incidence of postoperative complications.

1.6 Statistical methods

SPSS® 23.0 was used for data analysis. The measurement data was measured by mean ± standard deviation ( ) and t test was used for comparison between the two groups. The rate of counting data (%) was used for comparison between the two groups, and P < 0.05 was statistically significant.

2. The Results

2.1 Comparison of postoperative related indicators between the two groups

There was no significant difference between the two groups in operative time, intraoperative blood loss, gastric tube indwelling time and other indicators (P> 0.05); Among the 31 patients in group A, there was 1 pancreatic fistula and 2 biliary fistula with pancreatic fistula, which were cured after adequate drainage and enhanced nutrition.
The complications, length of hospital stay and removal time of gastric tube in group A were all less than those in group B, and the differences were statistically significant ($P<0.05$), see Table 2.

**Table 2. Comparison of postoperative related indicators of different gastric tube placement sites between the two groups**

<table>
<thead>
<tr>
<th>project classification</th>
<th>Group A (n=31)</th>
<th>Group B (n=46)</th>
<th>$\chi^2/T$ value</th>
<th>P values</th>
</tr>
</thead>
<tbody>
<tr>
<td>The operation time</td>
<td>-</td>
<td>5.87±1.17</td>
<td>5.56±1.42</td>
<td>-1.022*</td>
</tr>
<tr>
<td>Intraoperative blood loss</td>
<td>-</td>
<td>375.81±118.93</td>
<td>380.87±201.89</td>
<td>0.126*</td>
</tr>
<tr>
<td>Indwelling time of gastric tube complications</td>
<td>-</td>
<td>6.48±1.80</td>
<td>7.27±4.76</td>
<td>0.947*</td>
</tr>
<tr>
<td>There is no Pancreatic fistula</td>
<td>28(90.3)</td>
<td>26(56.5)</td>
<td>12.951*</td>
<td>0.012</td>
</tr>
<tr>
<td>Biliary fistula</td>
<td>1(3.2)</td>
<td>1(3.2)</td>
<td>1(3.2)</td>
<td></td>
</tr>
<tr>
<td>Pancreatic fistula and biliary fistula infection</td>
<td>2(6.5)</td>
<td>2(4.3)</td>
<td>2(6.5)</td>
<td></td>
</tr>
<tr>
<td>The length of time</td>
<td>-</td>
<td>23.29±8.61</td>
<td>30.24±16.57</td>
<td>2.144*</td>
</tr>
</tbody>
</table>

Note: A represents $t$ value, and $t$-test of two independent samples is adopted. B represents the value of 2 and uses the row × column Chi-square test.

### 3. Discussion

Pancreaticoduodenectomy is a common surgical method for periampullary carcinoma. Although with the progress of modern medical technology, the mortality rate after pancreaticoduodenectomy is significantly reduced, pancreatic fistula and biliary fistula still occur to a certain extent [8]. Pancreatic fistula is the most fatal and common complication after pancreaticoduodenectomy, and the postoperative incidence is approximately 2%-46% [9-14], which is also the difficulty in the treatment of postoperative complications. The occurrence of pancreatic fistula is closely related to whether the pressure in the input loop can be effectively reduced. Majority of patients with pancreatic resection duodenum 1-2 days pancreatic juice secretion decreased, there were notable increases from pancreatic juice quantity after 5 days, pancreatic intestinal anastomosis at this time is not yet completely healed, the gastrointestinal tract is in a state of paralysis, a large number of pancreatic juice, bile was accumulated in anastomotic weeks, along with the increase in the accumulation of fluid, can lead to anastomotic suture fracture, anastomotic leakage, and through leaks into the peritoneal cavity, Local infection and even corrosion of adjacent blood vessels, secondary biliary fistula, bleeding, abdominal infection, and even death [14-15]. Although there are many methods for the prevention and treatment of pancreatic fistula after pancreaticoduodenectomy, such as drug prevention, improvement of surgical methods and preoperative reduction of yellow, etc. [16-21], these methods cannot completely prevent the occurrence of pancreatic fistula and biliary fistula. Therefore, this study attempted to divide the patients into two groups, A and B, according to the different sites of gastric tube implantation. The main purpose of this study was to drain pancreatic juice and bile from the patients in time through gastric tube before the gastrointestinal function was recovered, so as to reduce the pressure in the jejunum input loop lumen and reduce the occurrence of biliopancrea-biliopancrea-biliary anastomotic fistula.

The results of this study showed that the operative time of patients in the two groups was not statistically significant, but the postoperative complications and hospital stay of patients in group A were less than those in group B, which was statistically significant, indicating that the gastric tube placement position in group A had a more significant effect on the prevention of postoperative pancreatic fistula and biliary fistula complications. The reasons are as follows: (1) in the study group A gastric tube gastric bowel loops jejunum anastomosis in input about 20-25 cm, front near bile intestinal anastomosis inner lumen, and “6-0” Prolene line fixed in gastrointestinal anastomosis after wall, gastric tube position relatively deep, deep place of the tube at the same time after A negative pressure absorbing, can make the pancreas end keep fit closely with the body jejunum, Effectively ensure the integrity and tightness of anastomosis, thus reducing the probability of pancreatic fluid entering the abdominal cavity; (2) Deep gastric tube can reduce the tension of pancreaticointestinal anastomosis, effectively improve the blood circulation at the broken end of pancreas, reduce the high tension of the anastomosis, and effectively prevent tissue ischemic necrosis and broken end tear; (3) Before the anastomosis is healed, the gastric tube drains the pancreatic juice secreted...
by the pancreas to the body in advance, which further reduces the probability of pancreatic juice contacting the anastomosis and thus reduces the corrosion of the anastomosis.

Intraoperative blood loss is also an important indicator of complications [22]. However, there was no statistical significance in intraoperative blood loss and gastric tube indwelling time between the two groups in this study. This may be due to the small sample size of the study group and insignificant differences.

The average length of stay is an important indicator of surgical efficacy. The statistical results of this data show that the length of stay in group A is significantly shorter than that in group B, and the incidence of postoperative complications such as pancreatic fistula, biliary fistula and related infections in group A is also lower than that in group B. All the above indicators show that the gastric tube is inserted into the jejunum from the gastrointestinal anastomosis. The front end of the gastric tube to the vicinity of the bilioenteric anastomosis has a significant effect on patients undergoing pancreaticoduodenectomy, which has a significant advantage over the proximal end of the input loop inserted by the gastric tube from the gastrointestinal anastomosis. It can effectively prevent postoperative pancreatic fistula and biliary fistula complications, and is a safe drainage method suitable for clinical promotion.

The deficiency of this study is that due to the influence of sample size, technology, individual differences of subjects and other factors, some conclusions of this study may be biased to a certain extent, which needs to be further confirmed by large samples and multi-center studies in the future.

To sum up, through the retrospective study the author thinks that the stomach tube gastric bowel loops jejunum anastomosis in the input, stomach tube front end to near bile intestinal anastomosis can effectively reduce pancreatic resection duodenum patients the incidence of pancreatic fistula, biliary fistula, and to improve the quality of survival, the degree of hospitalized patients and reduce the day in hospital played an important role.

References


